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CARIBBEAN MARINE SHELLS

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Florida's population expansion appears to have stimulated interest in shell collecting, particularly in south Florida and that lovely chain of picturesque islands extending to the southeast, an area abounding in historic localities from which so many of our western Atlantic types were collected and described by d'Orbigny, Reeve, Sowerby, C. B. Adams, Mörch and others. A few notes and observations plus three hitherto undescribed species from this general Caribbean area are hereby brought to attention, together with a brief review of the genus *Bursa* as presently known from the western Atlantic. Of particular interest to Florida collectors is the fact that all species in this group may be taken in south Florida, either from the shallows or the deeper waters off shore.

Genus *BURSA* Röding, 1798

BURSA FINLAYI, new species.

Plate 3, fig. 2.

Shell rather large, thin but strong, evenly rounded whorls, relatively slender spire and pronounced sharp heavy nodules at the shoulder. Whorls 7, plus a white naticoid nucleus of about 4 whorls. Early nuclear whorls sculptured with fine axial riblets and 3 spiral threads, the riblets disappearing first, then the spiral threads, leaving the final $\frac{1}{3}$ whorl smooth. Shell sculpture consists of beads and nodules arranged in spiral rows, the shoulder bearing a row of heavy pointed nodules with a second and lesser row just below at the periphery. Rows of beads and sharp nodules vary in size, the rows of small and heavy beads often alternate. Entire surface of shell covered with very fine cancellate sculpture. Varices unevenly spaced, not in line, about $\frac{2}{3}$ of a whorl apart. Color straw, with diffused markings of light brown. Aperture ovate, with a flush of delicate orchid within, and the parietal wall has some brown between many white folds.

Holotype: Length 43 mm., width 24 mm., U. S. Nat. Mus. no. 634570, dredged 215° off Sombrero Key Light, Florida Keys, on the rocky Pourtales Plateau, 115 fathoms, McGinty, leg., "Triton" Station 615, July 8, 1951. Three paratypes in the McGinty collection from the "Triton" dredging are from off Sand Key Light, Key West, Florida, 70-75 fathoms.

Figure 1 and 1a (nucleus).—Cuban paratype: Length 84.7 mm., width 42 mm., in the McGinty collection, taken by Mr. Finlay from fish trap, rocky bottom, 100-110 fathoms, at Gibara, Oriente Province, Cuba, September 1958. Paratypes from the Gibara station, also from Matanzas Bay, Cuba, 100-125 fathoms, all from fish traps with hermit crabs, are in the collection of Mr. John Finlay, and through his generosity a Cuban paratype has been donated to the USNM.

Remarks.—This new species may best be compared with *Bursa tenuisculpta* Dautzenberg and Fischer, 1906, originally described from Madeira and the Azores, the only Atlantic species to be placed in the rather artificial subgenus *Tutufa* Jousseume, 1881, with *Bursa finlayi* now to be added. *Bursa finlayi* appears to live in slightly deeper water, and the shell is larger and more spinose than *B. tenuisculpta*.

This attractive large *Bursa* is named for John Finlay, whose active research has added greatly to our knowledge of Cuban shells.

Bursa tenuisculpta, (figure 3), dredged on the rocky Pourtales Plateau, off Sombrero Key Light, Florida Keys, 115 fathoms, McGinty, leg., "Triton," June 14, 1950. (Figured for comparison) Size: Length 60 mm., width 32.5 mm.

The nuclear shell is almost always eroded on adult specimens of *B. tenuisculpta*, but two young specimens, taken in the "Triton" dredgings off the Florida Keys, have perfect nuclear whorls showing the same delicate sculpture as *B. finlayi*. Both species have a nucleus of similar size, but with *B. tenuisculpta* nearly the entire last whorl is without sculpture, while on *B. finlayi* only about the last $\frac{1}{3}$ whorl is smooth. I hope that the nucleus and operculum of the eastern Atlantic *B. tenuisculpta* may eventually be compared with this western Atlantic representative.

Figure 3a.—Concentric and corneous operculum with central nucleus from the live specimen of *Bursa tenuisculpta* shown in figure 3. Greatest diameter, 10.5 mm.

A brief review of the now known remaining members of the western Atlantic *Bursa* group follows:

Bursa thomae (Orbigny, 1842). Range from Palm Beach, Florida to Brazil. This reef loving species may be taken from very shallow water, under rocks and coral, or to a depth of about

40 fathoms. It may readily be identified by its lavender mouth and small size.

Bursa corrugata (Perry, 1811). The brown form of this species, with flattened outer lip, is figured beautifully in color on plate 9, figure "k", in Abbott's "American Seashells." I wish to extend its known range from Brazil to off Palm Beach, Florida, 75 fathoms, mud and broken shell, McGinty, leg., "Triton" Station 1242, August 1, 1953. Almost invariably this form, with the brown lip, is taken with a decollate spire. There is, however, another smaller variant of *B. corrugata*, with white lip, which occurs without decollation. This has been figured (September 1948) on the cover of Lyman's "Shell Notes," Vol. 2, No. 4. It is quite scarce, but 3 specimens have passed through my hands for identification, habitats as follows: reef off Ft. Lauderdale, Florida, 5 fathoms, (J. W. Donovan); reef off Key Largo, Florida, (C. J. Finlay); and from Varadero, Cuba, (H. H. Monroe).

Bursa cubaniana (Orbigny, 1812). Range from south Florida to the Caribbean, perhaps the best known in the group. The writer has observed a female of this species resting upon its rather large cup shaped egg case, late in spring, under rocks in very shallow water. I suspect that this position is retained until the tiny young are ready to be turned loose, as appears to be the case with our common *Cypraea zebra*. The female has a larger shell than the male, and the nucleus of *B. cubaniana* has delicate cancellate sculpture, as in *B. finlayi*.

Bursa spadicea (Montfort, 1810). Range from within Lake Worth, Florida, (*Nautilus* 54:71) to Dutch Guiana, northern coast of South America. This is a flattened species, always scarce, with a delicate cancellate nucleus and unguulate operculum.

Genus *COLUBRARIA* Schumacker, 1817

COLUBRARIA MONROEI, new species. Plate 3, figs. 4 and 4a.

Shell small, slender, fusiform, rather thin, of about 5 whorls including the smooth bulbous nucleus of about $1\frac{1}{2}$ whorls. Rounded varices, 3 per whorl, axially placed one below another. Surface delicately and beautifully sculptured with fine spiral threads and less distinct axial ribs, giving the surface a finely cancellate appearance. Aperture narrow, long, smooth within; outer lip thickened by last varix, the edge crenulate. Inner lip thin, only slightly raised, smooth within. Siphonal fasciole distinct, open, with a former siphonal fasciole visible from the face view. Color light straw to white.

Holotype: Length 7.2 mm., width 2.7 mm., USNM. no. 634571. The holotype and two paratypes were collected in fresh condition from beach drift at Varadero Beach, Cuba, by H. H. Monroe and a paratype is in his own collection, another in the McGinty collection.

Remarks.—It is curious that a new Caribbean *Colubraria* would appear at this late date, but *C. monroei* is quite distinct from the two well known species, *lanceolata* Menke and *obscura* Reeve, both from the same area. *C. monroei* may easily be identified by the alignment of the varices on successive whorls, and also by its much smaller size. This unusually attractive and beautifully sculptured *Colubraria* is named for Henry H. Monroe, whose extensive collecting in Cuba and the West Indies has brought together an outstanding collection from this area.

Genus *RISSOINA* Orbigny, 1840

RISSOINA SHEAFERI, new species.

Plate 3, fig. 5.

Shell large for the genus, slender, strong, of about 11 whorls including the smooth, rounded nucleus of about 2 whorls. Beautifully sculptured with strong axial ribs and much weaker spirals, the spirals very weak between the ribs, but a faintly beaded sculpture developing where the spirals cross the ribs. Sutural channels weak, siphonal fasciole low and broad, outer lip thickened. Color white.

Holotype: Length 9.3 mm., width 3.8 mm., collected at Hastings Rocks, Barbados, in the USNM. no. 634572. Paratype collected at Colon, Caribbean Panama, by T. L. McGinty, April 5, 1953. Additional records: Almirante, Caribbean Panama, A. A. Olsson, collector, 1920; Christiansted Reef, St. Croix, Virgin Islands, Gordon Ustick, collector, October 1961, a fine large specimen, length about 13 mm.

Remarks.—This striking new *Rissoina* may be placed in the subgenus *Phosinella* Mörch, 1876. The sculpture is less reticulate than *cancellata* Philippi or *sagraiana* Orbigny, and the shell is larger than either, *R. sagraiana* being rather small, about 5 mm. This large and handsome *Rissoina* is named for Clinton W. Sheaffer, whose many trips to the Caribbean have produced much valuable conchological material.

Genus *FUSILATIRUS* McGinty, 1955

FUSILATIRUS ERNESTI (Melville, 1910).

Plate 3, fig. 6.

A specimen of this interesting little shell, with raised white spiral threads on the dark brown shell, was collected at Varadero, Cuba, by H. H. Monroe. Length 8.8 mm. (apex and part of

the siphonal canal lost), width 4 mm. It is shown in figure 6, in the hope that it may become better known. I have also examined a second, even better specimen, collected by Gordon Usticke at Maid Island, Antigua. This specimen, about 10 mm. in length, has low, wide, rounded ribs and the white spirals are quite striking against the very dark brown of the shell. These attractive little shells appear to belong in the genus *Fusilaturus*, but a positive determination may not be made without a study of the radula. In 1941, in an excellent paper, my friend Dr. Fritz Haas described a new and very colorful shell from Yucatan, Mexico, as *Latirus festivus*. This species also appears to belong in the genus *Fusilaturus*. A reproduction of Melville's original figure of *Latirus ernesti* is shown in this paper.

Genus *ATYS* Montfort, 1810

ATYS CARIBAEA (Orbigny, 1841).

Considerable confusion has existed for many years in the correct identification of this attractive, fairly common, small, thin, white bulla-like shell. As a result of a recent examination of Orbigny's types in the British Museum, the spiral lines are now known to be confined to the ends of the shell, and the center is entirely smooth. Although the outline of Orbigny's original figure compares favorably with the types of *caribaea* examined, the artist wrongly covered the center of the shell with spiral lines, an error which has confused identification for many years. I find no way to separate *Atys guildingi* Sowerby, 1869, or *Atys riiseana* Mörch, 1875, and believe them to be synonymous. With a remarkable depth range, *caribaea* has been found living in Lake Worth, Florida, in sand and grass in 2 feet of water, and at over 100 fathoms, mud, where it was taken alive in the "Triton" dredging off Palm Beach, Florida. The figure in Abbott's "American Seashells," page 278, fig. 59c, is a good representation of an average specimen of *caribaea*. Although Dall's *Atys sandersoni* came from the great depth of 805 fathoms, a further examination of his type may prove that this is also a synonym of *caribaea*.

There is another more slender *Atys* which lives with *caribaea*, but at a reduced depth range. This *Atys*, with spiral lines which usually cover the entire surface, was identified as *Atys sharpi* Vanatta by Dr. Pilsbry some years ago. Usticke's *Atys lineata*, which lives in shallow water with both *caribaea* and *sharpi*, is probably a subspecies of *sharpi*.

Genus *SOLARIELLA* Wood, 1842

SOLARIELLA CARVALHOI Lopes and Cardoso, 1958.

This little shell, about 6 mm., described from Sao Paulo, Brazil, shallow water, has an outline much like *S. peramabilis* from the Pacific coast of North America, but differs by having 3 spiral keels above the flat shoulder. It now has been dredged alive from shallow water off Varadero, Cuba, by John Finlay (C. J. Finlay). It also has been taken on the nearby beach by C. J. Finlay, H. H. Monroe and J. A. Weber. I believe these are the first records for this species north of Brazil, greatly extending its known range.

SPAWNING AND EARLY LIFE HISTORY OF *HALIOTIS RUFESCENS* SWAINSON

By JOHN G. CARLISLE, JR.

The present paper, much briefer than initially intended, was originally planned as a master's thesis upon completion of studies begun in 1940 at Stanford University's Hopkins Marine Station. Because of ensuing interruptions, including military service during World War 2, I have not been able to complete the studies. The information at hand, however, is deemed of interest because of the complete lack of knowledge of the larval life in nature of any of the species of *Haliotis* from the west coast of North America.

Data on the larval development of Japanese species of *Haliotis* were published in 1952 (Ino, 1952) and some of his information has been intergraded into this paper to make it more complete.

Historical account. The generic name *Haliotis*, meaning "sea-car," was given by Linnaeus in 1758 in his "Systema naturae." Sea ears or abalones belong to the family Haliotidae, sub-class Streptoneura of the class Gastropoda, order Aspidobranchia, sub-order Rhipidoglossa. They have changed little since Oligocene times.

According to Crofts (1929, 1937, 1955) *Haliotis* shows many of the archaic features of the Aspidobranchia, retaining the original bilateral symmetry in the heart, excretory and respiratory systems. There is complete torsion of the mantle cavity and shell through 180 degrees.

Species of abalone are found along the west coast of North